

Appl. No. 10/065,044
 Amdt. Dated August 11, 2004
 Reply to Office action of June 2, 2004

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Canceled)
2. (Currently Amended) The method of claim 4_7 wherein the plurality of MR detector coils comprises a spatial filter bank formed with the respective sensitivity profiles for spatially filtering the plurality of detected MR signals.
3. (original)The method of claim 2 wherein the detector coils are arranged to optimize the spatial encoding of the spatial filter bank.
4. (Currently Amended) The method of claim 4_7 wherein the detecting step involves collecting a decimated plurality of gradient-encoded MR signals to generate a plurality of decimated signals, and the processing step comprises the steps of:
 interpolating the plurality of decimated signals to generate a plurality of interpolated signals; and,
 applying at least one of a lapped transform and a synthesis filter bank to reconstruct interpolated signals .
5. (original)The method of claim 4 wherein the decimated gradient encoding consists of reduced phase encoding steps, resulting in fewer lines of k space.
6. (Canceled)
7. (Currently Amended) A method for reconstruction for use in a parallel MRI system wherein a plurality of MR detector coils are arranged in an array and each coil has a corresponding spatial sensitivity profile, the method comprising:
detecting a plurality of gradient-encoded MR signals from the plurality of MR detector coils;
processing the detected MR signals with at least one filter bank to reconstruct at least one image; and
~~The method of claim 4 further comprising~~ an intermediate filtering step of applying an intermediate filter bank between the decimated gradient encoding and interpolating steps for stabilizing the processing step for reconstructing the at least one image.
8. (Currently Amended) A method for reconstruction for use in a parallel MRI system wherein a plurality of MR detector coils are arranged in an array and each coil has a corresponding spatial sensitivity profile, the method comprising:
detecting a plurality of gradient-encoded MR signals from the plurality of MR detector coils;
processing the detected MR signals with at least one filter bank to reconstruct at least one image; and
~~The method of claim 7 wherein the filter bank and the intermediate filter bank satisfies an equation in accordance~~
 with $G(z)^T = \begin{pmatrix} z^{-d} & 0 & \cdots & 0 \end{pmatrix} F_o^{-1}(z) V^{-1}(z^M)$, wherein $G(z)$ represents a synthesis filter bank $F_o(z)$ is an

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aliasing component matrix of the sensitivity profiles F , z -d is a time delay, V is an additional filter bank inserted between the decimation stage and the interpolation stage for stability and M is a decimation factor.

9. (Currently Amended) The method of claim 4-7 wherein the at least one image is substantially free of aliasing and amplitude distortion

10. (Currently Amended) The method of claim 4-7 wherein the sensitivity profiles of the array are overlapping and further comprising the step of applying a lapped transform to the detected signals during the processing step.

11. (Currently Amended) The method of claim 4-7 wherein the array is a strip array comprised of a plurality of array elements each element being a linear strip.

12. (Currently Amended) The method of claim 4-7 wherein the array comprises a strip array of a plurality of conductive strips, each strip having a corresponding phase relationship to a spatial location within an object to be imaged in the MRI system and the processing step comprises encoding each of the corresponding phases to reconstruct the at least one image.

13. (Canceled)

14. (Currently Amended) The parallel MRI system of claim 13-19 wherein the array of MR detector coils comprises a spatial filter bank formed with the respective sensitivity profiles for spatially filtering the plurality of detected MR signals.

15. (Previously Presented) The parallel MRI system of claim 14 wherein the detector coils are arranged to optimize the spatial encoding of the spatial filter bank.

16. (Currently Amended) The parallel MRI system of claim 13-19, further comprising
a decimated gradient encoding system to generate a plurality of the decimated MR signals; and,
an interpolating system for interpolating the plurality of decimated signals to generate a plurality of interpolated signals; and
at least one of a lapped transform and a synthesis filter bank to reconstruct interpolated signals .

17. (original) The parallel MRI system of claim 16 wherein the decimated gradient encoding system comprises reduced phase encoding steps

18. (canceled)

19. (Currently Amended) A parallel Magnetic Resonance Imaging (MRI) system comprising:

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an array of magnetic resonance (MR) detector coils arranged in an array for detecting a plurality of MR signals, each of the coils having a corresponding spatial sensitivity profile;

a processing means for processing the plurality of MR signals with at least one filter bank to reconstruct at least one image;

~~The parallel MRI system of claim 13 further comprising:~~

an intermediate filter coupled between the decimated gradient encoding and the interpolating system, the intermediate filter stabilizing the processing means for reconstructing the at least one image.

20. (Currently Amended) ~~The parallel MRI system of claim 19~~

A parallel Magnetic Resonance Imaging (MRI) system comprising:

an array of magnetic resonance (MR) detector coils arranged in an array for detecting a plurality of MR signals, each of the coils having a corresponding spatial sensitivity profile;

a processing means for processing the plurality of MR signals with at least one filter bank to reconstruct at least one image; wherein the filter bank and the intermediate filter bank satisfies an equation in accordance with

$G(z)^T = (z^{-d} \ 0 \ \dots \ 0) F_a^{-1}(z) V^{-1}(z^M)$, wherein $G(z)$ represents a synthesis filter bank, $F_a(z)$ is an aliasing component matrix of the sensitivity profiles F , z^{-d} is a time delay, V is an additional filter bank inserted between the decimation stage and the interpolation stage for stability and M is a decimation factor.

21. (Currently Amended) The parallel MRI system of claim ~~13~~19 wherein the at least one image is substantially free of aliasing and amplitude distortion.

22. (Currently Amended) The parallel MRI system of claim ~~13~~19 wherein the sensitivity profiles of the array are overlapping and further comprising the step of applying a lapped transform to the detected signals during the processing step.

23. (canceled)

24. (Currently Amended) The parallel MRI system of claim ~~13~~19 wherein the array comprises a strip array of a plurality of conductive strips, each strip having a corresponding phase relationship to a spatial location within an object to be imaged in the MRI system and the processing step comprises encoding each of the corresponding phases to reconstruct the at least one image.